BAILEY

A design for a City School Building

Architecture

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DESIGN FOR A CITY SCHOOL BUILDING

BY

WALTER THOMAS BAILEY

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THESIS

Submitted in Partial Fulfillment of the Requirements for the

Degree of

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IN

THE GRADUATE SCHOOL

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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

Walter Thomas Bailey

ENTITLED Design for a City School Building

BE ACCEPTED AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE

DEGREE OF Master of Architecture

J. W. Case. In Charge of Major Work

N. Clifford Ricker Head of Department

Recommendation concurred in:

N. Clifford Ricker
A. P. Carman
Edward C. Schmidt

Committee on Final Examination

The object of this thesis is to describe the most recent methods of school building planning and construction; and to illustrate them in the accompanying thesis design.

The problem of comfortably and properly housing, in the midst of the confusion and congestion of a large city, an army of school children is an elaborate one, which may be conveniently classified for discussion under the following heads:

1 To accommodate the standard class of 44 pupils in a room as compact and economical as is consistent with the comfort and health of the inmates.

2 To give the pupils clean wholesome air, unvarying in temperature and, if possible, in humidity.

3 To provide the rooms in which they work with abundant daylight so directed as to favor to the utmost the eyes of the pupils.

4 To provide further a similar artificial illumination for night work.

5 To introduce into each room a certain amount of sunshine.

6 To furnish each pupil with a desk and chair especially adapted to the individual physique.

7 To encourage under the proper conditions the spirit of play, indoors and out, by providing play grounds and play rooms.

8 To provide clean and abundant toilets, wash rooms and coat rooms.

9 To provide a medical examiner's room for the better care of children who are ill or uncleanly in their habits.

10 To equip the building with every device needed to accomplish an easy and prompt administration of the school, in-

cluding clock, bell and telephone systems, fire exits, offices and store rooms.

11 To provide an assembly hall for general exercises.

12 To give the children a building which will offer every reasonable discouragement to dirt and dampness; which will be cheerful, not easily marred or injured, safe from fire, and beautiful enough to lead the pupils' taste rather upward than downward; and to do all this with that rigid economy of the public funds which the citizens have a right to demandof their servants, the commissioners.

Let us examine in detail the above summary of requirements for the thesis design under discussion:

1 The size of the standard class room, seating 44 pupils (formerly 56) has been reduced from 24 feet by 30 feet by 13 feet (in height) for primary, and 26 feet by 32 feet by 13 feet for grammar, to 23 feet by 29 feet by 12 feet for all elementary grades. This reduction in the class room unit results in more material and labor per cubic foot, inasmuch as the walls, floors and ceilings which contain the labor and material, decrease directly as the dimensions of the room, while the cube decreases as the square of the dimensions. This would indicate a higher cost per cubic foot other conditions being the same. It is, therefore, surprising and gratifying to note that two new Boston schools, built under the above conditions,- the Nathan Hale, a small building of twelve rooms, and the Bishop Cheverus, of 16 rooms, cost but eighteen cents per cubic foot - an unprecentedly low figure. The Nathan Hale cost $67,320, with a cube of 362,000; and the Bishop Cheverus $102,937, with a cube of

540,000. The cost per pupil in the Bishop Cheverus, $160.84, is far below the average, $197.13, while that in the Nathan Hale, $140.26, is the lowest but one on record, where the average (lower elementary) is $162.83.

The class room is the fundamental unit of the school-house design. In American practice it is distinguished on the one hand from the recitation room, which has only chairs or settees for the pupils and is used, as its name implies, only for recitations (or sometimes also for lectures and dictation exercises), and on the other from the general study room, which is found more frequently in Europe than with us, and in which a number of classes, aggregating a hundred or two of pupils, spend the assigned hours of study between recitations. The normal American class room accommodates from 30 to 50 (or rarely up to 60) pupils as fixed desks. In some special or private schools the number in a class room is as low as 25; but economy of administration makes it desirable that the number should not fall below 30 to 35, while efficiency demands that it should not greatly or often exceed 40. Each pupil has a desk; and the total floor area should not be less than 18 square feet per pupil, with at least 216 cubic feet as the minimum cubic volume per pupil. Twenty square feet and 260 feet, respectively, are better figures for all except the lower grades attended by small children. A slightly oblong room, with the teacher's desk at one end, is the best shape. Thus for a 40-desk class room in an upper grade grammar school or high school, a room 32 by 25 feet, 13 or 14 feet high in the clear, would represent excellent practice. One ample door, 40 to

44 inches wide, should be provided near the teacher's end of the room, alike for entrance and for exit. Such a door is wide enough to allow two files to pass in or out at once; and is under the teacher's eye and full control. A wide aisle, 3½ to 5 feet wide, should skirt the room next the corridor wall, and a narrower aisle next the window wall and the rear end of the room. Six rows of seven desks each from front to rear can be conveniently placed in a room of the above dimensions. More than seven or eight desks in a row place the rearmost pupils too far from the teacher and the blackboard, so that the length is best not much over 32 to 36 feet; and it is undesirable to make the class room more than 25 feet wide. Widths of from 27 to 30 feet are common in the United States, but do not represent the ideal practice.

2 The problem of heating and ventilating has become a more and more complex one. Some departments have recently adopted the more economical policy of doing their own engineering work, instead of employing for this work outside domestic engineers. There has been a systematic effort to get rid of the galvanized iron ducts by using concrete trenches under the basement floor, for both fresh and tempered air, and building the vertical ducts of brick, pointed on the inside, or keystone blocks made smooth on the inside. This reduces the cost by a considerable amount and simplifies the construction, making less demand for repairs and renewals.

The thesis design which I have under discussion is equipped with the gravity low pressure system of indirect heating, with supplementary coils at the bases of the vertical ducts. Motor

fans are also added. The temperature of the air entering the class rooms is controlled by hand mixing-dampers, operated by the teachers. Each occupant of the room is provided with 30 cubic feet of air a minute, the amount required by most of the state laws.

Experiments are being carried on to discover a practical method of maintaining a constant degree of humidity in the air. No system yet devised has given results sufficiently good to warrant the expenditure necessary to install it.

The importance of adequate artificial ventilation cannot be exaggerated; and modern school-houses are as a rule much better equipped in this respect than was formerly thought necessary. But it must be remembered that thorough artificial ventilation is always an expensive luxury, both in first cost and in operation and maintenance. Moreover it is in practice inseparably connected with the problem of heating; although the two functions are in theory wholly distinct and independent. While the fundamental principles are simple enough, their application involves many technical complications; and for any considerable building a competent and independent consulting engineer should be engaged to plan or assist in planning the heating and ventilating installation. Unfortunately a considerable proportion of the professional heating and ventilating engineers are directly interested in the particular systems of particular companies manufacturing various types of apparatus. It is universally agreed that the fundamental requirement for the ventilation of all class rooms and assembly rooms is the supply of 30 cubic feet of fresh air per minute for each pupil up to the maximum number allowed for

the room in question; while the heating plant should be adequate to raise the temperature to 70 degrees Fahrenheit in zero weather. All the textbooks and handbooks on heating and ventilating contain formulae for calculating the square feet of radiating surface required to accomplish this under varying conditions for hot water, steam and hot air respectively; and also for horsepower of boilers. These enable the architect to figure the data for the required plant himself if he chooses, or to go over and check the figures of bidders who may offer their various systems in competition. In any case the architect who has thus figured out independently the requirements of his building will be in a better position to discuss matters with his engineering expert, as well as with competing heating companies, than one who has to rely implicitly on the figures they supply.

But, however perfect the heating and ventilating plant, and however faultless its operation, let is be clearly understood and always remembered that no artificial heating and ventilating can ever take the place of fresh outside air and sunshine. Every room that is ever occupied for any length of time by human beings should, if possible, be so placed as to receive at some time in the day the direct rays of the sun and the fresh breezes of the outer world; and no matter how abundantly ventilated by artificial means, it should have its windows thrown open for a while every day when not occupied to allow free access to the outside air. No class room, gymnasium or assembly room should be so placed as to be deprived of these important adjuncts to the mechanical supply of heat and fresh air. Air blown by fans over coils of heating pipes can, at best, only prevent the undue exhaustion of

the oxygen in the room, and is often powerless to remove the odors and stuffiness produced by a crowd of human beings, though these odors will entirely disappear after all the windows have been opened for five or ten minutes. The placing of the auditorium in the center of a solid block of buildings, surrounded by corridors on all sides, lighted only from overhead and ventilated solely by artificial means, is to be avoided; though it is often the easiest solution of the problem. In a large high school in New Jersey, which has been the object of some notice in the northern part of the State, the auditorium, seating over 1000, is wholly enclosed by corridors with windows opening directly into it so that any vitiation of the air in one is shared by the other and neither it nor the corridors ever receive the direct light of day or a breath of air directly from out of doors. The arrangement is to be condemned from every point of view. If not positively unsanitary, it is at least unsatisfactory, inartistic and lacking in cheerfulness.

3 The windows are placed on the long side for left hand lighting. The usual precaution should be taken of making the area of glass, measured inside the sash, not less than twenty per cent of the floor area. If the outside light is obstructed by neighboring buildings, this allowance should be increased. The window heads should be built square and kept close to the ceiling, as the top light is the most efficient.

The width of the area effectively lighted by windows opening upon open spaces or wide streets not lined with excessively tall buildings is in our brilliant North American climate about twice the height of the window heads from the floor for class rooms.

In other words, the section of adequate lighting is a right triangle having a base equal to twice its altitude, that is, with an acute angle of 28 degrees and 15 minutes, and the desks should be so placed that the one farthest from the window should have its top at least partly within this triangle. Where the windows open upon a court of moderate size, upon a narrow street, or upon a street of fair width but lined with very high buildings, this is too large an allowance; the rooms should be reduced from 10 to 20 per cent in width. The ideal solution would be one in which a ray at 28 degrees and 15 minutes coming over the roofs of the average height on the opposite side of the street would just touch the window sills of the lowest class room in the school. In the populous cities this can not always be realized, but on the more open sites available in the suburban towns, it is always practicable. Theoretically, a line drawn through the window heads, parallel to one connecting the window stool with the shadow casting edge of the wall or roof opposite, will, if the inclination be steeper than the conventional angle of 28 degrees and 32 minutes, determine with its intersection with the floor the width of the efficiently lighted area of the class room. When the angle is equal to or less than 28 degrees and 32 minutes, the case enters the normal category and falls under the general rule. Of course when the resulting diagram reduces the width very greatly, that is, when the inclination of the tangent ray from the roof to sill is steeper than 35 degrees, one most compromise. The rooms will have to be made wider than the diagram would allow and the windows increased in width to make up for the part

of their inadequate height, or the story must be made higher, or better still, the building set further back from the street. In any building in which the inefficient lighting on the lower floor cannot be remedied, as few class rooms as possible, or none at all, should be placed on that floor. That a hundred pupils should have a flight of stairs to climb is a far less evil than that twenty of them should have their eyesight injured.

Bilateral lighting is permissible only in wide study rooms and laboratories, when 35 or more feet in width, and in auditoriums. Avoid placing windows opposite the teacher's desk in corner class rooms and opposite the seated audience in an assembly room. Avoid also any great expanse of windows opposite the speaker on the platform. The ideal audience room has light from two sides, with additional light from overhead if necessary.

In the United States class room windows are made four feet wide between jambs; the window stools are usually set about three feet above the floor, although they are often - as is generally the case in Germany - set one foot higher to prevent the pupils from looking out. For this purpose the lower sash of some of the latest German schools are glazed with ribbed glass.

In some of the Swiss cantons any condition that prevents the children from looking out of the windows is held to be objectionable; and the window stools are set 2½ feet high. The most recent rules for the Berlin schools permit about the same minimum height of sill.

The top of the windows should come as near the ceiling as their finish will permit; and the finish, if any, should not exceed six inches in width. In France it is required that the head

of the window should be practically flush with the ceiling.

Transoms in windows are objectionable as the bars cut off valuable light, and with them, teachers are more easily tempted to lower the temperature by opening the windows. By the dropping of the transom the air is admitted with less direct draft than by lowering a hung sash, but the occasion for any such admission of outer air should seldom exist in a school equipped with the proper warming and ventilating apparatus. The primary function of a class room window is the admission of light; and such windows should be devised to meet this end most advantageously.

Windows evenly distributed in the wall give better diffusion of light than that given from a mullion group of equal glass area, placed in the center of the room; for, with the latter arrangement, the corners of the room are in shadow. There is of course no objection to the use of mullioned windows if the light is so ample that none of the desks are shadowed; and providing that the building is so constructed that a proper temperature may be maintained with so large a glass area as is required in such case. As has been done in later New York City schools, the mullioned window can be used with no increase of cost of construction in skeleton steel frame buildings.

In English schools, and in those of the continent of Europe, casement sash, instead of hung sash commonly used in the United States, is usually found. Casement sash, while in a measure shielding the pupils from direct drafts when opened, are especially awkward to manage when double, and entail much more wood work than do hung sash; hence, are more obstructive of light.

4 The rapidly growing need for night schools requires a complete equipment for artificial light in the class rooms. The number of outlets in each room has been reduced from nine to six. The fixture is a simple chain or stem pendant, with a 60 watt Tungsten or 100 watt G. E. M. lamp, and an acid etched holophane shade. The system is therefore one of direct light and affords a twenty or twenty five per cent gain in efficiency per watt to offset the reduction in the number of outlets. The change from reflected and transmitted to direct light has been the outcome of experiments which appear to demonstrate that direct light from above and slightly to the left of the pupil (accomplished by placing the lights forward and off center of the room toward the window wall), has two advantages over the former system: It utilizes a larger per cent of the light; and it affords some shadow and in such a direction as distinctly to aid the unconscious sense of location of the pupil. It appears also to be a more cheerful light; and it is only for special cases, where drafting rooms require the most careful adjustment, that the modern schools now use indirect light.

5 The selection of the lot and the planning of the building are influenced as much by the requirement for sunshine in every class room as by any other consideration. It means lining up the class rooms on the east, south and west exposures; and running the corridor along the northern outside wall. To accomplish this the Nathan Hale school is designed with an L plan, and the Bishop Cheverus with an open U. In Prussia a northern exposure for class rooms is that now most favored, if the conditions permit; and other authorities have like preference for this aspect

but an easterly or south-easterly exposure is generally considered the most desirable for these rooms. By the former the room is sunned early in the morning, and the pupils are not disturbed by the glare of the light during the exercises. The northern exposure should not be adopted unless the windows are fitted with double sash, and the rooms are thoroughly warmed and scientifically ventilated. When so equipped, a direct southern or western exposure is less desirable for class rooms than is a northerly exposure.

6 To favor every weakness of physique and make the pupil as comfortable as is possible, every chair back should be adjustable, as well as every desk. The patterns of castings used for these fixtures should be reduced to the greatest simplicity and durability; but the benefit of the adjustable furniture will always depend largely upon the faithfulness with which it is used.

The desks of the primary grades are 13 by 21 inches; 31 inches is allowed from the front of the desk to the back of the seat. The smaller size desk for the primary classes is 12 by 18 inches, the space from the front of the desk to the back of the seat being 29 inches. In the grammar grade desks are 16 by 24 inches; the space from the front of the desk to the back of the seat is 34 inches. In class rooms of the primary grades the aisles between the desks are 17 inches wide, and in those of the grammar grade they are 18 inches wide.

7 The play grounds should be located on the sunny side of the building and planted with trees. The school board should endeavor to obtain a lot which will contain about 35 square feet

of vacant ground per pupil, the greater part of which is used for these play grounds.

It is largely on the play grounds of our schools and colleges that the attributes that make the necessary qualifications for good citizenship are fostered. The teachers in charge of the play grounds and those spaces provided in large cities for the recreation of the children on holidays and after school hours are unanimous in the verdict that they are powerful factors in the mental and moral development of the school children. It is a healthy sign that those in charge of educational matters in this country are awakening to a true sense of the importance of recreation in the school life, and are making provision for this in the planning of our schools.

The Playground Association of America has been organized to provide adequate play grounds in districts where, owing to the congestion of population, there would ordinarily be no space for this purpose. Dr. Gulick of this Association recently stated: "A fundamental condition for the permanent development of a free people is that they shall in childhood learn to govern themselves. Self government is to be learned by experience rather than taught as a theory; hence, in a permanent democracy, adequate play grounds for all the children are a necessity."

In France school yards are often ornamented by landscape effects, but in such a manner that the space for recreation is not materially lessened. Trees or climbing vines are trained to grow upon the enclosing brick walls, and even in winter the effect of this growth is pleasing, for the branches are arranged

with design and not allowed to grow haphazard. A special characteristic of the Scandinavian schools is the school garden, the pupils being taught therein the principles of agriculture and horticulture. In England, in the Scandinavian countries, and in France covered play grounds are provided. These sometimes occupy a part of the first floor of the building, but sometimes and preferably, they are separate structures. It is usual in France - and until lately it has been customary in England - to wholly enclose the school premises with high brick walls. In later English schools a brick wall four feet high with an unclimbable iron fence above is used to enclose the premises. In Germany the playground is generally cut off from view. Such enclosure of the yeard is rarely found in Switzerland or in the United States. The open fences used in these countries permit the air to circulate freely and offer no obstruction to the sunlight; and they are certainly to be preferred on the south and west sides of the premises, unless there chances to be unsightly or otherwise objectionable surroundings, when brick walls should be built. On the north and east sides such walls, seven feet high, are desirable, as they furnish protection from the cold winds. It would be well if these walls were given the landscape treatment which is found in France.

In Germany the borders of the school yards are often planted with shade trees where possible, but such a requirement presupposes ample grounds about the building, for the minimum allowable distance for a tree from a school is 20 feet.

8 Toilet rooms and cloak rooms are the subjects of more

discussion than any other feature of school design. Toilet rooms are sometimes grouped in the basement; sometimes placed on all of the different floors; sometimes grouped on each floor; sometimes scattered so as to connect one with each class room or pair of class rooms, and sometimes two systems are combined. Every system thus far tried has its drawbacks. To require every pupil to go to the basement in order to use a lavatory or water closet is not only unkind and unsanitary (seriously so in cases of sudden and severe illness), but resort to the basement easily becomes a means for gatherings of pupils during class hours for mischief, play or other puposes not legitimate to the time and place. The basement toilet rooms are however less expensive to install and maintain than scattered toilets. In any case a fair allowance of toilet rooms for boys and for girls should be assigned to the basement for use during recess and at the times of entering and leaving the building, as well as in connection with the gymnasium and baths, if such be provided.

When toilets are also provided on each floor, as they ought to be, the problem is one of distribution. Those for the two sexes should of course be as completely and widely separated as possible. Economy suggests their arrangement in stacks or towers, or at least in superposition throughout. When they are grouped in two stacks or towers, one for each sex, projecting outwardly to the rear or into a court, it is possible to separate them from the corridors by short intermediate entries provided with cross-drafts from opposite windows. This gives absolute protection against any intrusion of odors or foul air into the corridors.

Moreover it places the entire system of piping outside the main structure where leaks cannot injure other rooms and repairs need not disturb the school's work. Fixtures and toilet rooms used by a considerable number of persons in a short space of time always give forth some odor for a while after use; moreover, not all plumbing and fixtures are always kept in perfect condition, and the school should be protected against the consequences alike of accident and misuse.

No one solution is therefore ideal, and as the value of one or another system depends greatly on the discipline, character and traditions of the school and its pupils, these must be considered by the architect in conference with the teachers and school officials in deciding which system to adopt. It goes without saying that every toilet room, even the small ones attached to the teachers' rooms, should have direct light and air from out of doors; and that special careful provision for mechanical ventilation of all the pupils' toilet rooms should be made.

As to the cloak rooms, there are two chief systems in use for the care of pupils' outer clothing: General cloak rooms in the basement, and class cloak rooms on every floor. The advantage of the first of the two systems is that pupils leave behind them their outer clothing upon entering the building and take it again only on leaving. Thus muddy overshoes and damp coats and cloaks are not carried up into the corridors or class rooms of the building. The disadvantages lie in the difficulty of supervising the crowds of pupils at the times of entering and leav-

ing the building; and the danger of pilfering in the cloak rooms. To obviate these difficulties individual lockers are provided in some schools, the pupil having a key that opens his own locker. But this provision of lockers requires a great amount of space; is costly, and subject to the annoyance of frequent loss of keys. It can only be applied where space and funds are generally ample.

The class cloak room system provides a long and narrow cloak room or closet next each room. This has the disadvantage of requiring pupils to come through the halls to their class rooms before taking off or disposing of their outer clothing. On the other hand, the wraps, hats and overshoes so disposed of are always under the teacher's supervision; and the congregating of several hundred boys or girls in the basement at the close of school is avoided. Class cloak rooms should never jut into the hallways. They are best placed transversely, with an outer window at one end, and with two doors opening into the class room. They should never be used as thoroughfares and hence should not open into the corridors. Whether they should be placed behind or opposite the teacher's desk is usually determined by circumstances. They should always be provided with forced ventilation and especially strong aspiration, so that air may be drawn from the class room through the cloak closet, and not move in the reverse direction. One end may be divided off by a wire mesh or grille screen to form a teacher's coat closet. The hooks should be spaced on each wall about twelve inches apart, and alternately at a higher and lower level, so that in a given row they will be two feet apart. This makes for ease in finding one's own hook.

The height of the two rows should be adapted to the average size of the pupils of the grade using the class room.

Whether the class room or the general basement cloak room should be adopted in a given case depends largely upon the regulations prevailing for entering and leaving the building. The class system is more often used in grammar and primary schools, and the general cloak room in high schools, with or without lockers. But there is no absolute rule in the matter.

9 The medical examiner's room is a recent and important factor in the school regime. It should be designed along the lines of a modern hospital room, terrazzo floor, tiled wainscot, special device for shampooing and bath, if required, medical cabinet, etc.

10 The administration should always be highly efficient. Every room should be provided with a secondary clock, run from a master clock in the principal's office. In the primary schools, push buttons control the signal bells; in the higher schools they are operated automatically by master clocks according to a prearranged program. There should be a single center telephone system connecting all the rooms with the master's or his assistant's office.

11 Not all public schools require assembly halls, and where they are required - especially in high schools - they serve very varied functions in different places. They are usually planned to accommodate considerably more than the maximum number of pupils enrolled; and are often in demand for meetings or entertainments outside of the regular school program. Allow 6½ to 7 square

feet per seat for the total area of the floor, exclusive of the stage or platform, but including aisles, and arrange these so that the center of no seat is further than eleven feet from an aisle.

Assembly halls should have natural light from one or both sides in addition to overhead lighting, if any; but there should be no windows facing the audience or speakers, especially the former.

The assembly hall is best placed on the ground floor or on the first or main floor. It is undesirable to place it on the third or top floor as is often done, not merely because of the additional danger from fire or panic, but because of the increase of otherwise unnecessary stair climbing that results. From this point of view the second floor is the most convenient as being midway in height, but if general exercises are held daily at the opening or closing of the session, the first floor or ground floor is still more convenient because of its nearness to the level of the entrance and exit of the school. The hall should have ample doorways and plenty of them, and these should be arranged for the most convenient access to and from the stairs.

The width of exits should be equivalent to 15 inches for every hundred of seating capacity in the building as measured by the aggregate seating capacity of the assembly room and school rooms. The main corridors should never be less than eight feet wide, and in larger buildings, 10 feet wide should be the minimum. It is however wasteful to make them more than 12 to 14 feet wide, except at points near the top or bottom of stairways, or at entrances or exits and other points of probable congestion,

where the width should be suitably expanded. Minor corridors may be six or eight feet wide. It goes without saying that corridors should be as straight and well lighted as possible.

The stairways should never be less than two in number, complete from top to bottom of the building, and should always be sufficient to empty the school in three minutes. They should be so placed as to be in the shortest possible reach of the largest number of class rooms; for example, so that no class room door shall be more than about forty feet distant from a flight. They should moreover be located at conspicuous points in the plan, where the position is clearly announced by the architectural features of the interior. Their width should be such as to allow two files of pupils to ascend or descend with sufficient intervening space to permit of the passage of one or more persons between them. A width of five feet is the minimum, and 5½ feet is better. Six feet is the maximum width allowable; any greater width than this is wasteful. There should always be two runs and a single wide landing between each floor and the next; never three runs with two landings if it can possibly be avoided, and never a single straight run from one story to the next. The two runs should be in the reverse directions. There should therefore be no open well between the runs. It is sometimes recommended to divide the staircases from the corridors by wire glass partitions and safety doors, but this is a precaution of doubtful utility, if not actually a source of possible danger. The stairs should of course be well lighted by windows.

12 Throughout the design of the buildings the most careful

consideration should be given to the use of materials and profiles in order to avoid dirt. The result will be the elimination of elaborate mouldings in wood or plaster finish, and the universal adoption of the hospital base in its various forms as well as curved angles in connection with granolithic floors. To protect the building from dust the windows should all be fitted with metal weather strips. The cost of repairs is reduced to a minimum by constructing the sash of small panes and protecting the windows overlooking the playgrounds with wire grilles.

To safeguard the children against fire the most careful planning should be followed out. All doors from the building should open out. The children's entrances are always to the basement, and are independent of but convenient to the staircases up. The staircases should lead to the basement, making basement entrances as well as others available. The buildings should be entirely fireproof; and the clearest approach to the stairs is considered the best. Metal doors should be used for class rooms, as this would make these rooms safe even if the corridors were filled with smoke.

The fundamental question however is not that of the finish, but of the framework or shell of the building. This ought always to be of fireproof materials. Unfortunately not every school board or community has as yet reached the point where it thinks it can afford really fireproof construction. Where this is not possible it should be absolutely insisted upon that all corridors and stairways should be fireproof, that is, built of non-combustible materials; all iron framing being protected. All

plastering should be upon wire lath and wooden furring should be prohibited. Boilers and furnaces should be in a thoroughly fire-proof room, and the building should be equipped with one or more standpipes and hose in conspicuous and central locations on each floor.

In summing up, it is plainly visible that steady progress is being made toward providing ideal accommodation for the city's school children; progress not only on the scientific and engineering side, but even in the direction of more beautiful structures.

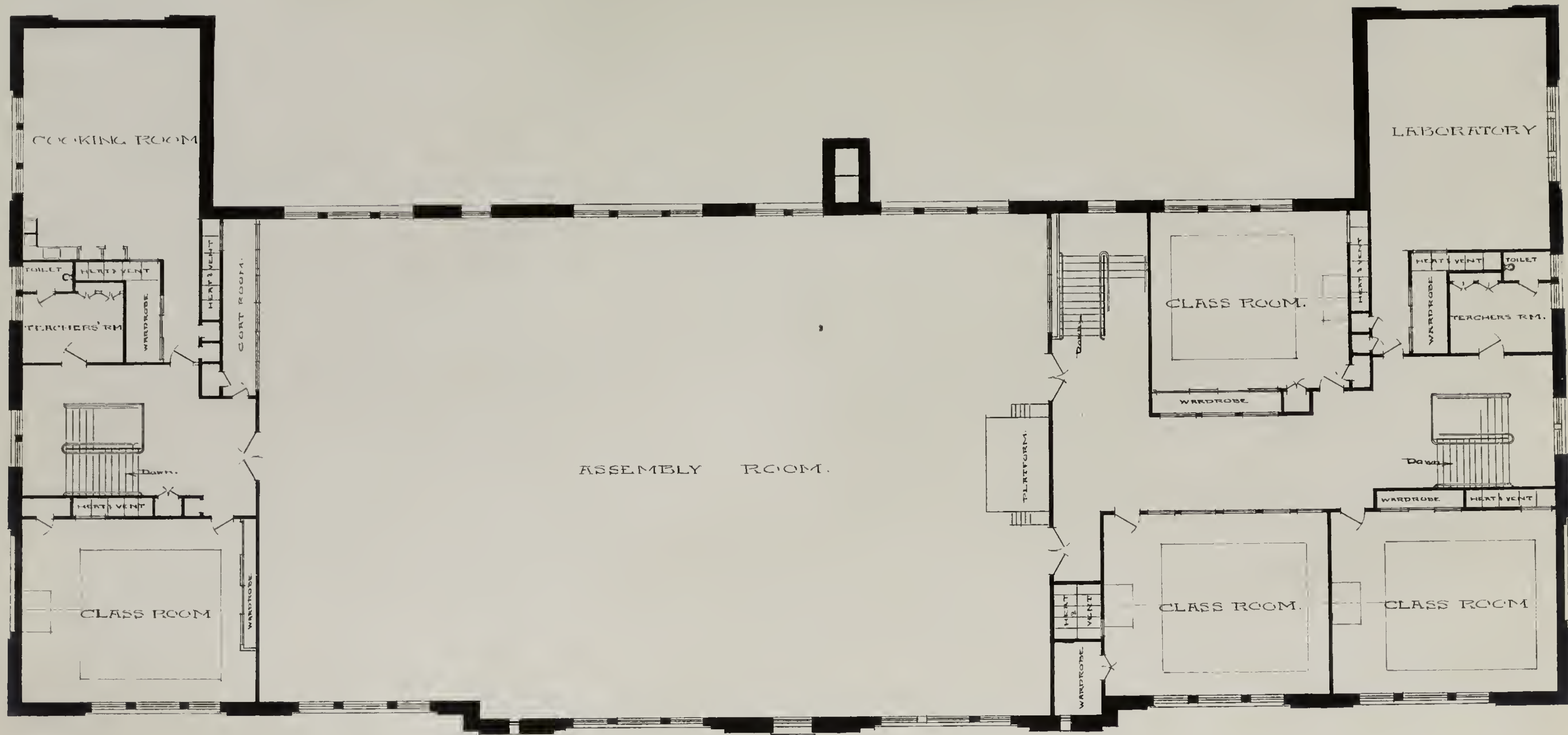
FRONT ELEVATION.

THESIS DESIGN FOR A CITY SCHOOL BUILDING

BY

WALTER THOMAS BAILEY

SCALE 1/8" - 1'-0"



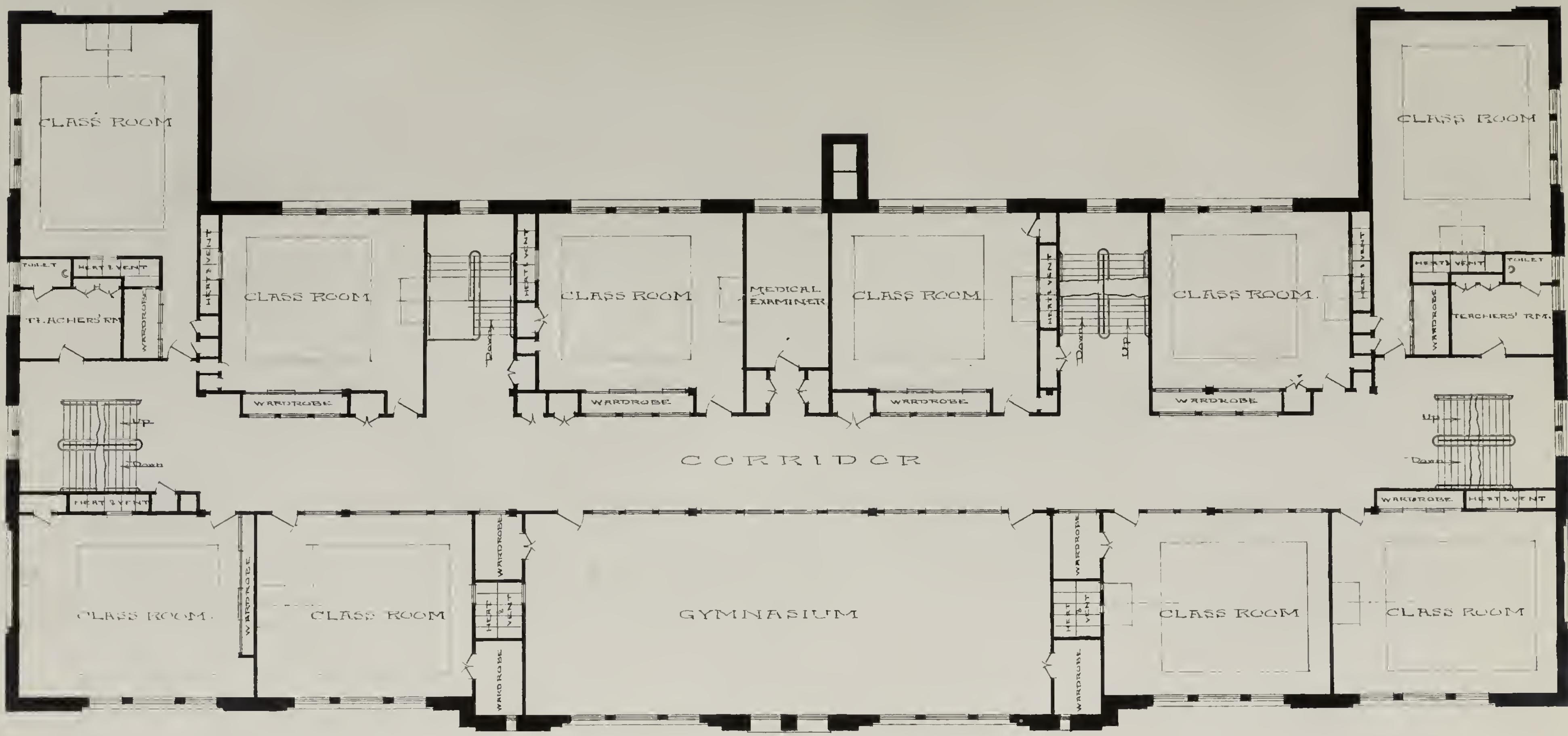
THIRD FLOOR PLAN.

THESIS DESIGN FOR A CITY SCHOOL BUILDING

BY

WALTER THOMAS BAILEY

SCALE 1/8" - 1'-0"



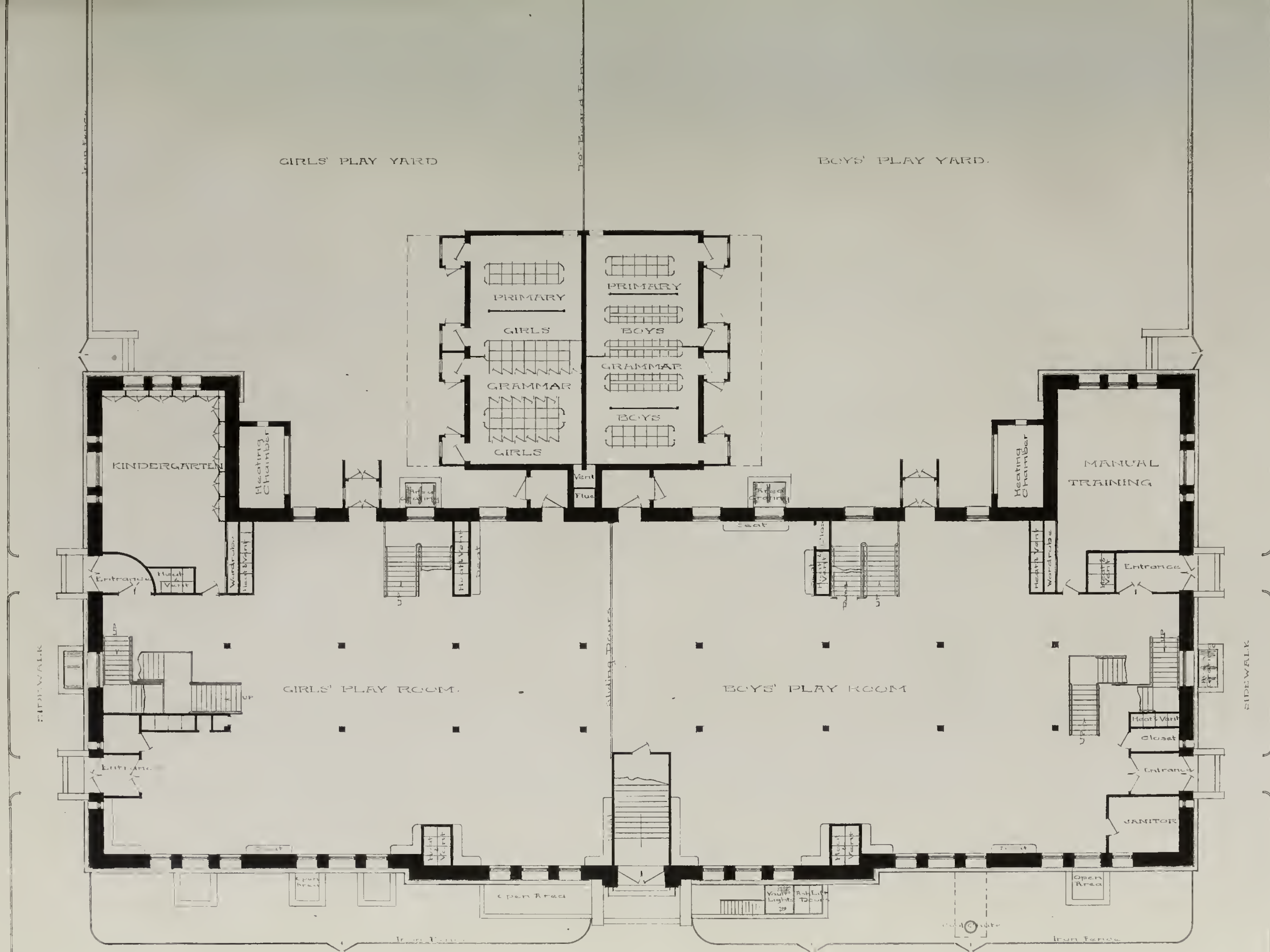
SECOND FLOOR PLAN.

THESIS DESIGN FOR A CITY SCHOOL BUILDING

BY

WALTER THOMAS BAILEY

SCALE 1/8 - 1 - 0



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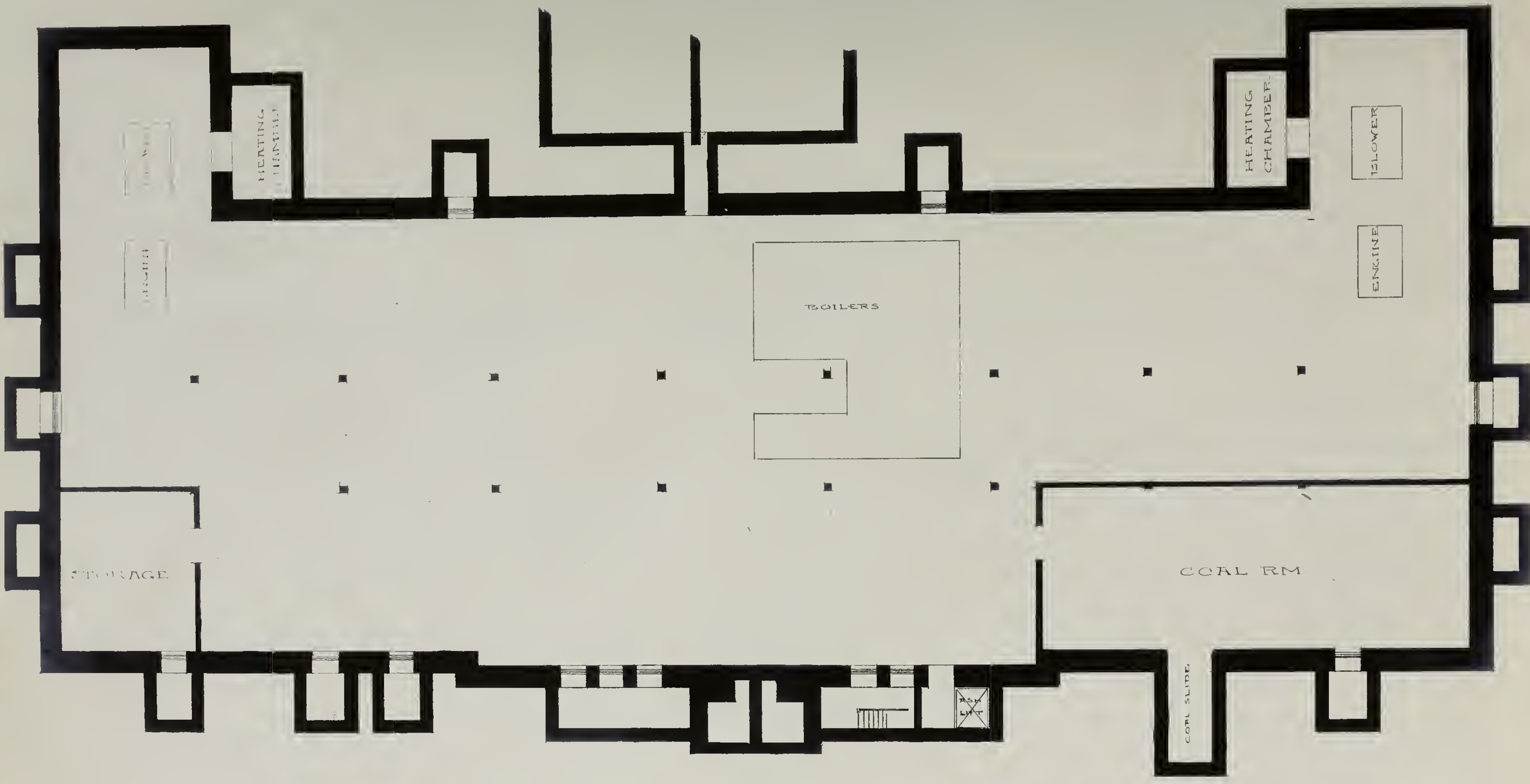


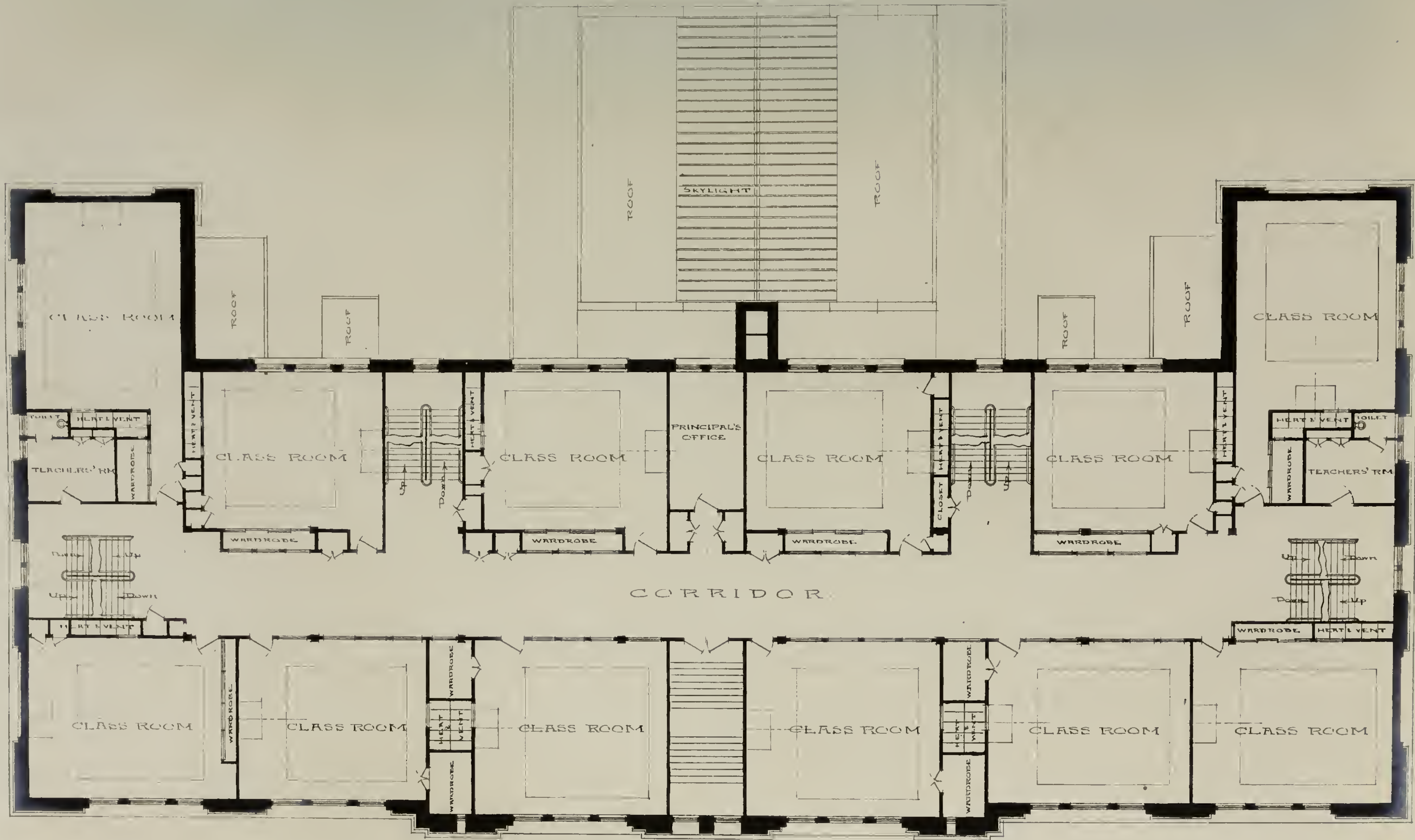
BASEMENT PLAN

THESIS DESIGN FOR A CITY SCHOOL BUILDING

BY

WALTER THOMAS BAILEY

SCALE 1/8" = 1'-0"



FIRST FLOOR PLAN

THESIS DESIGN FOR A CITY SCHOOL BUILDING

BY

WALTER THOMAS BAILEY

SCALE 1/8" = 1'-0"